

1.1 MONITORING PLAN

Construction period

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Air quality	H ₂ S - CO ₂	Borinquen Hotel and 4 sites (north, south, east and west) on the well base boundary	During testing period (weeks-one month): every three month (quarterly) and permanent monitoring station	Field measurement	ICE

CAMPO GEOTERMICO BORINQUEN	Min CO2 (ppm)	Avg. CO2 (ppm)	Max CO2 (ppm)	Std. CO2 (ppm)	Min H2S (ppm)	Avg. H2S2 (ppm)	Max H2S (ppm)	Std. H2S (ppm)
CAÑAS DULCES	303	360	404	5000	0.000	0.000	0.001	0.014
CASA MAQUINAS BORINQUEN	260	351	410	5000	0.000	0.000	0.001	0.014
HOTEL BORINQUEN	204	314	373	5000	0.000	0.002	0.014	0.014
HOTEL BUENA VISTA	224	306	366	5000	0.000	0.000	0.001	0.014
PLB-02	174	315	385	5000	0.000	0.000	0.001	0.014
PLB-03	332	340	348	5000	0.000	0.000	0.000	0.014
PLB-04	147	274	346	5000	0.000	0.001	0.007	0.014
PLB-05	203	321	375	5000	0.000	0.000	0.000	0.014
PLB-09	233	318	351	5000	0.000	0.000	0.000	0.014
POBLADO BUENA VISTA	328	341	376	5000	0.000	0.000	0.000	0.014

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BORINQUEN GEOTHERMAL FIELD	Min CO2 (ppm)	Avg. CO2 (ppm)	Max CO2 (ppm)	Std. CO2 (ppm)	Min H2S (ppm)	Avg. H2S2 (ppm)	Max H2S (ppm)	Std. H2S (ppm)
CAÑAS DULCES								
02/10/2017	404	404	404	5000	0.000	0.000	0.000	0.014
10/10/2017	339	339	339	5000	0.000	0.000	0.000	0.014
17/10/2017	386	386	386	5000	0.000	0.000	0.000	0.014
23/10/2017	370	370	370	5000	0.001	0.001	0.001	0.014
30/10/2017	402	402	402	5000	0.000	0.000	0.000	0.014
06/11/2017	390	390	390	5000	0.000	0.000	0.000	0.014
13/11/2017	361	361	361	5000	0.000	0.000	0.000	0.014
20/11/2017	351	351	351	5000	0.000	0.000	0.000	0.014
27/11/2017	303	303	303	5000	0.001	0.001	0.001	0.014
05/12/2017	316	316	316	5000	0.001	0.001	0.001	0.014
14/12/2017	357	357	357	5000	0.000	0.000	0.000	0.014
19/12/2017	344	344	344	5000	0.000	0.000	0.000	0.014
POBLADO BUENA VISTA								
02/10/2017	410	410	410	5000	0.000	0.000	0.000	0.014
10/10/2017	331	331	331	5000	0.000	0.000	0.000	0.014
17/10/2017	375	375	375	5000	0.000	0.000	0.000	0.014
23/10/2017	340	340	340	5000	0.000	0.000	0.000	0.014
30/10/2017	396	396	396	5000	0.000	0.000	0.000	0.014
06/11/2017	392	392	392	5000	0.000	0.000	0.000	0.014
13/11/2017	330	330	330	5000	0.000	0.000	0.000	0.014
20/11/2017	336	336	336	5000	0.000	0.000	0.000	0.014
27/11/2017	366	366	366	5000	0.000	0.000	0.000	0.014
05/12/2017	260	260	260	5000	0.000	0.000	0.000	0.014
14/12/2017	337	337	337	5000	0.000	0.000	0.000	0.014
19/12/2017	333	333	333	5000	0.001	0.001	0.001	0.014
HOTEL BORINQUEN								
02/10/2017	352	352	352	5000	0.000	0.000	0.000	0.014
10/10/2017	333	333	333	5000	0.000	0.000	0.000	0.014
17/10/2017	362	362	362	5000	0.000	0.000	0.000	0.014
23/10/2017	338	338	338	5000	0.000	0.000	0.000	0.014
30/10/2017	373	373	373	5000	0.001	0.001	0.001	0.014
06/11/2017	337	337	337	5000	0.000	0.000	0.000	0.014
13/11/2017	204	204	204	5000	0.002	0.002	0.002	0.014
20/11/2017	286	286	286	5000	0.000	0.000	0.000	0.014
27/11/2017	296	296	296	5000	0.002	0.002	0.002	0.014

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05/12/2017	207	207	207	5000	0.001	0.001	0.001	0.014
14/12/2017	330	330	330	5000	0.001	0.001	0.001	0.014
19/12/2017	351	351	351	5000	0.014	0.014	0.014	0.014
HOTEL BUENA VISTA								
02/10/2017	330	330	330	5000	0.000	0.000	0.000	0.014
10/10/2017	331	331	331	5000	0.000	0.000	0.000	0.014
17/10/2017	326	326	326	5000	0.000	0.000	0.000	0.014
23/10/2017	366	366	366	5000	0.000	0.000	0.000	0.014
30/10/2017	298	298	298	5000	0.000	0.000	0.000	0.014
06/11/2017	331	331	331	5000	0.000	0.000	0.000	0.014
13/11/2017	224	224	224	5000	0.000	0.000	0.000	0.014
20/11/2017	257	257	257	5000	0.000	0.000	0.000	0.014
27/11/2017	332	332	332	5000	0.000	0.000	0.000	0.014
05/12/2017	245	245	245	5000	0.000	0.000	0.000	0.014
14/12/2017	326	326	326	5000	0.001	0.001	0.001	0.014
PLB-02								
02/10/2017	352	352	352	5000	0.000	0.000	0.000	0.014
10/10/2017	329	329	329	5000	0.000	0.000	0.000	0.014
17/10/2017	385	385	385	5000	0.000	0.000	0.000	0.014
23/10/2017	317	317	317	5000	0.000	0.000	0.000	0.014
30/10/2017	343	343	343	5000	0.000	0.000	0.000	0.014
06/11/2017	333	333	333	5000	0.000	0.000	0.000	0.014
13/11/2017	239	239	239	5000	0.000	0.000	0.000	0.014
20/11/2017	295	295	295	5000	0.000	0.000	0.000	0.014
27/11/2017	329	329	329	5000	0.001	0.001	0.001	0.014
05/12/2017	174	174	174	5000	0.000	0.000	0.000	0.014
14/12/2017	343	343	343	5000	0.001	0.001	0.001	0.014
19/12/2017	338	338	338	5000	0.001	0.001	0.001	0.014
PLB-03								
02/10/2017	348	348	348	5000	0.000	0.000	0.000	0.014
10/10/2017	332	332	332	5000	0.000	0.000	0.000	0.014
17/10/2017	346	346	346	5000	0.000	0.000	0.000	0.014
27/11/2017	334	334	334	5000	0.000	0.000	0.000	0.014
05/12/2017	336	336	336	5000	0.000	0.000	0.000	0.014
14/12/2017	334	334	334	5000	0.000	0.000	0.000	0.014
19/12/2017	347	347	347	5000	0.000	0.000	0.000	0.014
PLB-05								
02/10/2017	328	328	328	5000	0.000	0.000	0.000	0.014

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10/10/2017	346	346	346	5000	0.000	0.000	0.000	0.014
17/10/2017	314	314	314	5000	0.007	0.007	0.007	0.014
27/11/2017	147	147	147	5000	0.000	0.000	0.000	0.014
05/12/2017	150	150	150	5000	0.000	0.000	0.000	0.014
14/12/2017	310	310	310	5000	0.001	0.001	0.001	0.014
19/12/2017	326	326	326	5000	0.000	0.000	0.000	0.014
CASA MAQUINAS BORINQUEN								
02/10/2017	338	338	338	5000	0.000	0.000	0.000	0.014
10/10/2017	321	321	321	5000	0.000	0.000	0.000	0.014
17/10/2017	375	375	375	5000	0.000	0.000	0.000	0.014
23/10/2017	332	332	332	5000	0.000	0.000	0.000	0.014
30/10/2017	348	348	348	5000	0.000	0.000	0.000	0.014
06/11/2017	340	340	340	5000	0.000	0.000	0.000	0.014
13/11/2017	203	203	203	5000	0.000	0.000	0.000	0.014
20/11/2017	282	282	282	5000	0.000	0.000	0.000	0.014
27/11/2017	335	335	335	5000	0.000	0.000	0.000	0.014
05/12/2017	323	323	323	5000	0.000	0.000	0.000	0.014
14/12/2017	321	321	321	5000	0.000	0.000	0.000	0.014
19/12/2017	337	337	337	5000	0.000	0.000	0.000	0.014
PLB-04								
10/10/2017	332	332	332	5000	0.000	0.000	0.000	0.014
17/10/2017	351	351	351	5000	0.000	0.000	0.000	0.014
27/11/2017	329	329	329	5000	0.000	0.000	0.000	0.014
05/12/2017	233	233	233	5000	0.000	0.000	0.000	0.014
14/12/2017	330	330	330	5000	0.000	0.000	0.000	0.014
19/12/2017	332	332	332	5000	0.000	0.000	0.000	0.014
PLB-09								
02/10/2017	336	336	336	5000	0.000	0.000	0.000	0.014
10/10/2017	333	333	333	5000	0.000	0.000	0.000	0.014
17/10/2017	376	376	376	5000	0.000	0.000	0.000	0.014
27/11/2017	337	337	337	5000	0.000	0.000	0.000	0.014
14/12/2017	328	328	328	5000	0.000	0.000	0.000	0.014
19/12/2017	334	334	334	5000	0.000	0.000	0.000	0.014

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Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Noise	Noise level	Borinquen Hotel, one site on the well base boundary (in the hotel direction), and 4 sites (north, south, east and west) in the vicinity of the power plant site.	During testing period (weeks-one month): once/week During power plant construction: monthly (with peak time for each construction job taken into account)	Field measurement	ICE

CAMPO GEOTERMICO BORINQUEN	Min Noise (dB)	Avg. Noise (dB)	Max Noise (dB)	Std. Ruido (dB)
CAÑAS DULCES	41	46	50	65
CASA MAQUINAS BORINQUEN	31	43	71	65
HOTEL BORINQUEN	46	51	56	65
HOTEL BUENA VISTA	37	41	49	65
PLB-02	34	42	61	65
PLB-03	34	43	52	65
PLB-04	33	40	62	65
PLB-05	37	58	85	65
PLB-09	38	50	69	65
POBLADO BUENA VISTA	37	43	48	65

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BORINQUEN GEOTHERMAL FIELD	Min Noise (dB)	Avg. Noise (dB)	Max Noise (dB)	Std. Noise (dB)
CAÑAS DULCES				
02/10/2017	45	45	45	65
10/10/2017	47	47	47	65
17/10/2017	47	47	47	65
23/10/2017	45	45	45	65
30/10/2017	44	44	44	65
06/11/2017	50	50	50	65
13/11/2017	46	46	46	65
20/11/2017	49	49	49	65
27/11/2017	47	47	47	65
05/12/2017	44	44	44	65
14/12/2017	42	42	42	65
19/12/2017	41	41	41	65
POBLADO BUENA VISTA				
02/10/2017	46	46	46	65
10/10/2017	41	41	41	65
17/10/2017	45	45	45	65
23/10/2017	40	40	40	65
30/10/2017	45	45	45	65
06/11/2017	44	44	44	65
13/11/2017	41	41	41	65
20/11/2017	42	42	42	65
27/11/2017	47	47	47	65
05/12/2017	45	45	45	65
14/12/2017	37	37	37	65
19/12/2017	48	48	48	65
HOTEL BORINQUEN				
02/10/2017				65
10/10/2017	54	54	54	65
17/10/2017	52	52	52	65
23/10/2017	56	56	56	65
30/10/2017	48	48	48	65
06/11/2017	53	53	53	65
13/11/2017	55	55	55	65
20/11/2017	51	51	51	65
27/11/2017	48	48	48	65

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05/12/2017	51	51	51	65
14/12/2017	48	48	48	65
19/12/2017	46	46	46	65
HOTEL BUENA VISTA				
02/10/2017	49	49	49	65
10/10/2017	38	38	38	65
17/10/2017	46	46	46	65
23/10/2017	43	43	43	65
30/10/2017	38	38	38	65
06/11/2017	39	39	39	65
13/11/2017	43	43	43	65
20/11/2017	40	40	40	65
27/11/2017	43	43	43	65
05/12/2017	41	41	41	65
14/12/2017	37	37	37	65
PLB-02				
02/10/2017				65
10/10/2017	34	34	34	65
17/10/2017	51	51	51	65
23/10/2017	35	35	35	65
30/10/2017	41	41	41	65
06/11/2017	35	35	35	65
13/11/2017	36	36	36	65
20/11/2017	44	44	44	65
27/11/2017	61	61	61	65
05/12/2017	37	37	37	65
14/12/2017	42	42	42	65
19/12/2017	41	41	41	65
PLB-03				
02/10/2017	42	42	42	65
10/10/2017	46	46	46	65
17/10/2017	52	52	52	65
27/11/2017	50	50	50	65
05/12/2017	40	40	40	65
14/12/2017	39	39	39	65
19/12/2017	34	34	34	65
PLB-05				
02/10/2017	57	57	57	65

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10/10/2017	37	37	37	65
17/10/2017	48	48	48	65
27/11/2017	85	85	85	65
05/12/2017	71	71	71	65
14/12/2017	50	50	50	65
19/12/2017	59	59	59	65
CASA MAQUINAS BORINQUEN				
02/10/2017	47	47	47	65
10/10/2017	35	35	35	65
17/10/2017	51	51	51	65
23/10/2017	31	31	31	65
30/10/2017	47	47	47	65
06/11/2017	36	36	36	65
13/11/2017	35	35	35	65
20/11/2017	41	41	41	65
27/11/2017	71	71	71	65
05/12/2017	38	38	38	65
14/12/2017	40	40	40	65
19/12/2017	40	40	40	65
PLB-04				
10/10/2017	35	35	35	65
17/10/2017	38	38	38	65
27/11/2017	62	62	62	65
05/12/2017	35	35	35	65
14/12/2017	36	36	36	65
19/12/2017	33	33	33	65
PLB-09				
02/10/2017	49	49	49	65
10/10/2017	38	38	38	65
17/10/2017	50	50	50	65
27/11/2017	53	53	53	65
14/12/2017	69	69	69	65
19/12/2017	41	41	41	65

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Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Water quality	1) pH, Electric conductivity (EC), Chlorides (Cl-)	Upper and lower streams of the Salitral rivers, upper and lower streams within the project area (AP) of the creek running.	1) During testing period: twice/testing period (weeks-one month)	Laboratory analysis of collected samples	ICE and External laboratory to hire by ICE

Site	pH			Conductivity (µS/cm)			Chlorides (ppm)		
Standard	5-9			N/A			500		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
SALITRAL - PUENTE HOTEL	6.50	8.06	7.55	101.90	265.00	178.32	2.49	15.60	7.23
SALITRAL PGB-03	6.04	8.34	7.52	100.30	283.00	169.15	2.91	17.00	6.57
TOMA DE AGUA PGB-01 AGUAS ARRIBA	6.30	8.00	7.37	120.50	387.00	238.44	2.79	18.80	11.40
RIO SALITRAL ABAJO - POZO 4	6.30	8.20	7.56	100.70	323.00	168.48	2.41	19.00	6.40
NACIENTE NARAVIT	5.71	7.83	6.74	150.90	245.40	185.19	2.00	7.80	4.19
NACIENTE DOS QUEBRADAS	5.99	7.72	6.74	97.00	210.90	156.32	2.50	8.00	4.10
QUEBRADA PACAYALES	6.86	7.93	7.47	86.50	258.20	154.26	3.04	11.70	5.43
QUEBRADA GATA	5.36	8.12	7.20	122.50	348.00	210.68	1.31	12.20	5.75
TERMAL LOS PEDERNALES	5.95	7.28	6.63	138.70	181.70	158.67	2.64	4.72	3.16
TOMA AGUA LAS LILAS	5.90	7.01	6.65	141.50	189.00	177.11	3.79	11.50	5.53
Q. GALLINON	6.84	8.48	7.59	158.10	336.00	242.73	4.82	14.10	8.27
R. TIZATE ARRIBA	6.36	8.02	7.59	127.80	345.00	225.69	4.50	15.00	8.80
R. TIZATE ABAJO	7.59	8.27	0.00	127.40	273.00	218.35	5.20	16.10	8.84
PBR11 ARRIBA	5.76	7.81	6.98	74.50	263.00	147.28	1.80	11.30	5.17

Water quality	2) Oils and grease,	Outlet of the settling basin (construction work effluents). Only in the presence of machinery in the project area (AP)	2) Oils and grease, every six months (semester) After 2 years, the continuation of monitoring will be reconsidered based on opinions of professional experts.)	Laboratory analysis of collected samples	ICE and External laboratory to hire by ICE
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Site	Oils and grease (ppm)	
Standard	50	
	Min	Max
SALITRAL PGB-03	<1	4.00
QUEBRADA GATA	<1	4.00

Water quality	3) Hexavalent chrome (Cr+6), and Mercury (Hg) and COD	NOT APPLICABLE (NA)	NOT APPLICABLE (NA)	-----	
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Water quality	4) Arsenic (As)	Only in drinking water intakes	every six months (semester) After 2 years, the continuation of monitoring will be reconsidered based on opinions of professional experts.)	Laboratory analysis of collected samples	ICE and External laboratory to hire by ICE
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Site	Arsenic (mg/L)	
Standard	0,01	
	Min	Max
CAMPAMENTO CURUBANDE	<0.001	<0.002

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Soil	Complete analysis - Cadmium (Cd), Lead (Pb), As, Cr ⁺⁶ ,	Four points in the vicinity of a representative geothermal field	One year before construction starts, and once five years after operation starts	Laboratory analysis of collected samples	ICE

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	Hg, etc.	Four points in the vicinity of the power plant site	One year before construction starts, and once five years after operation starts		
Report Environmental Management CPG (Construction Group)					
Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Fauna and flora	Plants and animals (birds, amphibians, reptiles, and mammals)	Area in the vicinity of wells and power plant site, the project site side of the national park, and gallery forest along the Salitral river	Monthly (with rainy and dry seasons, breeding seasons, etc. taken into account)	Visual observation records and photographs	ICE
	Report Environmental Management CPG (Construction Group)				
Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Waste*	Generated amount	Power plant construction site	Monthly	Total of generated amount (weight or volume)	Construction contractor
	Report Environmental Management CPG (Construction Group)				

*Appropriate waste management including disposal of sludge will be implemented in accordance with Law for the Integrated Management of Residues (Law 8839), and in reference to Resolution No. 1948-2008-SETENA17 (page26).